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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/414,226	10/07/1999	CHORNG-PING CHANG	7-20-10	2991

7590

07/28/2003

AGERE SYSTEMS INC.
P. O. BOX 614
BERKELEY HEIGHTS, NJ 07922-0614

EXAMINER

KANG, DONGHEE

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 07/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/414,226

Applicant(s)

CHANG ET AL.

Examiner

Donghee Kang

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Acknowledgment

1. Applicant's Response to Paper No.14 has been entered and made of Record.

Claims 1-3 are pending in this application.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims **1-2** are rejected under 35 U.S.C. 102(e) as being anticipated by Inumiya et al. (US 6,054,355).

Re Claim 1, Inumiya et al. teach a semiconductor device comprising (Figs.9A-9I & Col.15, line 21-Col.16, line 53):

a semiconductor substrate (101; Col.15, line 31) in which a source (110 & 112; Col.15, 66 & Col.16, lines 6-7), drain (110 & 112; Col.15, 66 & Col.16, lines 6-7) and channel are formed;

a gate (117; Col.16, line 31) formed on a gate dielectric layer (116; Col.16, line 29) formed on the semiconductor substrate (101);

sidewall spacers (see Fig.9I) adjacent to the gate wherein the gate is interposed between the sidewall spacers and the gate and sidewall spacers are formed in a groove (114; Col.16, line17) formed in a layer of dielectric material (113; Col.16, lines 9-10)

formed on the substrate surface, wherein the groove (114) defines the distance between the source and the drain.

The term "groove" would meet the claimed term "trench" because the terms, trench and groove, are often used interchangeable in the art.

Inumiya et al. does not expressly mention the claimed term "spacers" in the disclosure. However, Inumiya et al. clearly teach in Fig.9I dielectric film 116 also formed as sidewall spacers inside the groove adjacent to the gate wherein the gate is interposed between the sidewall spacers and the gate and sidewall spacers are formed in the groove (trench).

Therefore, the 102 (e) rejection anticipates every element as set forth in claim 1.

Regarding claim 2, Inumiya et al. teach the distance between the sidewall insulating layers defines a device gate length.

4. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inumiya et al. (US 6,054,355) in view of Yu et al. (US 5,985,726).

Inumiya et al. teach substantially the entire claimed structure, as applied to claim 1 explained above, except that the distance between the sidewall spacers is less than 50 nm, wherein the distance defines a device gate length.

However, Yu et al. teach that trench (48) preferably is approximately 100-250 nm wide and spacers (50) are provided in trench (48), wherein spacers (50) can be each approximately 20-50 nm wide (Col.4, lines 59-62). Gate electrode (36) is formed

between the spacers (50; Col.5, line 12). According to the teaching above, the distance between spacers can be less than 50 nm in Yu et al.'s device.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the device of Inumiya et al. having a gate electrode which has a less than 50 nm length as taught by Yu et al. in order to decrease the physical size of transistor which in turn increase circuit layout density.

Response to Arguments

5. Applicant's arguments filed April 21, 2003 have been fully considered but they are not persuasive.

Applicant argues that Inumiya fails to teach the spacers and the gate are formed in the trench which defines the distance between the source and drain. This is not convincing. Inumiya clearly teach the sidewall spacer 116 and the gate electrode 117 are formed in the trench 114 that defines the distance between the source and drain. The trench 114 is formed in the dielectric materials 113 & 111 (see Fig.9).

Applicant also argues that the dummy gate is the same as the dimension of the replacement gate in Inumiya. Examiner disagrees with this remark. The dummy gate 103 is larger than the replacement gate 117 as shown in Figs.9E-9I because the sidewall spacer 116 is formed in the trench.

Conclusion

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

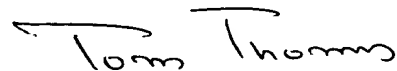
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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 703-305-9147. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.



TOM THOMAS
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

dhk
July 26, 2003